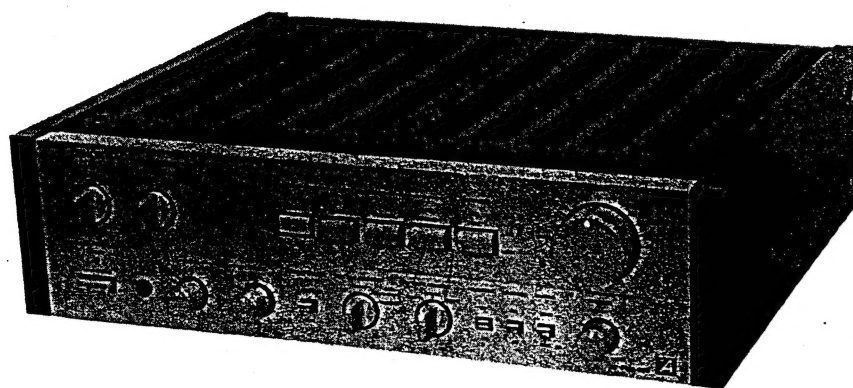


# DENON

Hi-Fi Pre-Main Amplifier

## SERVICE MANUAL MODEL PMA-950 PRE MAIN AMPLIFIER



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# NIPPON COLUMBIA CO., LTD.

## SPECIFICATIONS

## POWER AMPLIFIER SECTION (TUNER → SP OUT)

Rated Output:	Both channels driven
Subject to Change by	
Temperature Test:	20 Hz ~ 20 kHz 80 W + 80 W (8 ohm load) 1 kHz 100 W + 100 W (4 ohm load)
Total Harmonic Distortion:	Less than 0.004% Less than 0.01% (USA)
Intermodulation Distortion:	7 kHz/60 Hz : 1/4 at amplitude output equivalent to rated output Less than 0.004% Less than 0.01% (USA)
Output Band Width:	5 Hz ~ 100 kHz (IHF, T.H.D 0.03%)
Transmission	
Characteristics:	1 Hz ~ 250 kHz $^{+0}_{-3}$ dB (at 1 W output)
Input Sensitivity:	150 mV
Input Impedance:	40 k ohm
Output Impedance:	0.1 ohm (1 kHz)
SN Ratio (IHFA	
Network):	110 dB (Input terminals short- circuited)
Output Terminals:	Speaker: A & B load 4 ~ 16 ohm, A + B load 8 ~ 16 ohm; Head- phone/Stereo headphone (Imped- ance; changeable)

## EQUALIZER AMPLIFIER SECTION

## Equalizer Amplifier Output

(REC OUT Terminal): Maximum output 10 V (at 47  
k ohm load)  
Rated output 150 mV  
Total harmonic wave distortion:  
below 0.001% (at 1 kHz, 8 V  
output)

## Input Sensitivity/

Input Impedance:	PHONO-1MM 2.5 mV 47 k ohm
	PHONO-2MC 125 $\mu$ V 100 ohm
	TUNER 150 mV 40 k ohm
	AUX, TAPE 150 mV 40 k ohm

## RIAA Deviation:

PHONO-1MM	Within $\pm 0.2$ dB
PHONO-2	(20 Hz ~ 100kHz)
MC	Within $\pm 0.2$ dB
	(20 Hz ~ 100kHz)

## OVERALL CHARACTERISTICS

## SN Ratio (IHA

## Network):

PHONO-1MM	90 dB (Input ter- minals short-circuited, at 2.5 mV input)
PHONO-2MC	75 dB (Input ter- minals short-circuited, at 250 $\mu$ V input)
TUNER, TAPE, AUX	over 110 dB (Input terminals short- circuited)

## Tone Control Adjustable

## Range:

BASS	100 Hz $\pm 8$ dB
TREBLE	10 kHz $\pm 8$ dB

## Filtering Characteristics:

SUBSONIC	18 Hz, 6 dB/oct
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## Loudness Characteristics:

Low Frequency	100 Hz + 7 dB
High Frequency	10 kHz + 6 dB

## AC OUTLET:

Not included in systems for  
European use.  
SWITCHED x 2,100 W (Total)  
UNSWITCHED x 1,250 W

## POWER SOURCE:

110/120/220/240V (Multiple)

## POWER CONSUMPTION: 270 W

## DIMENSIONS:

470 mm (W) x 140 mm (H) x  
410 mm (D) (including rubber  
feet, control knobs, and terminals)

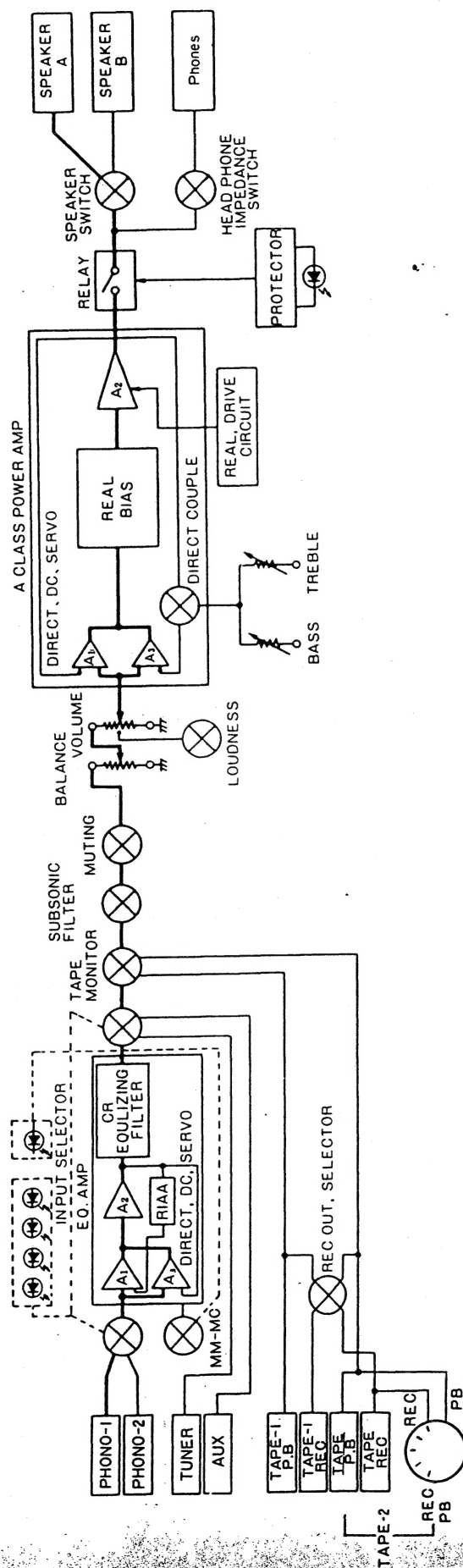
## WEIGHT:

14.5 kg

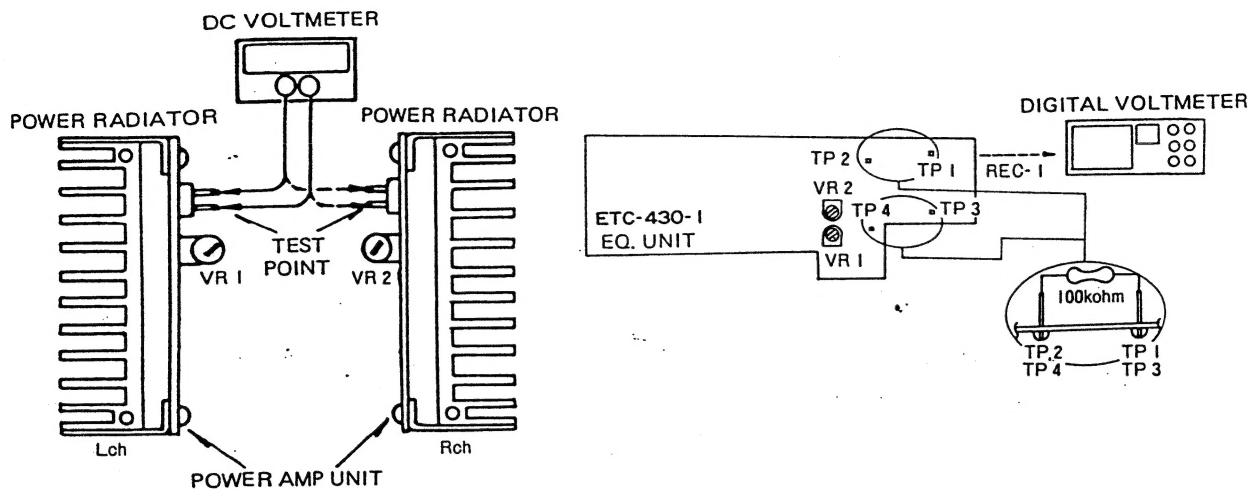
Design and specifications are subject to change without prior notice.

NOTE: The following codes correspond to the appropriate models.  
E2 for Europe and E1 for U.S.A., U.K., Hong Kong, Singapore.  
This Service Manual is prepared based on E1.

## BLOCK DIAGRAM



## METHOD OF ADJUSTMENT



## IDLE CURRENT ADJUSTMENT METHOD OF POWER AMP (PUS-029 PRINTED BOARD)

1. Place the unit in normal position, not sideways or tilted. Avoid too much ventilation, since the adjustment must be done where temperature is between 15°C and 30°C.
2. Set the switches on the unit as follows:
 

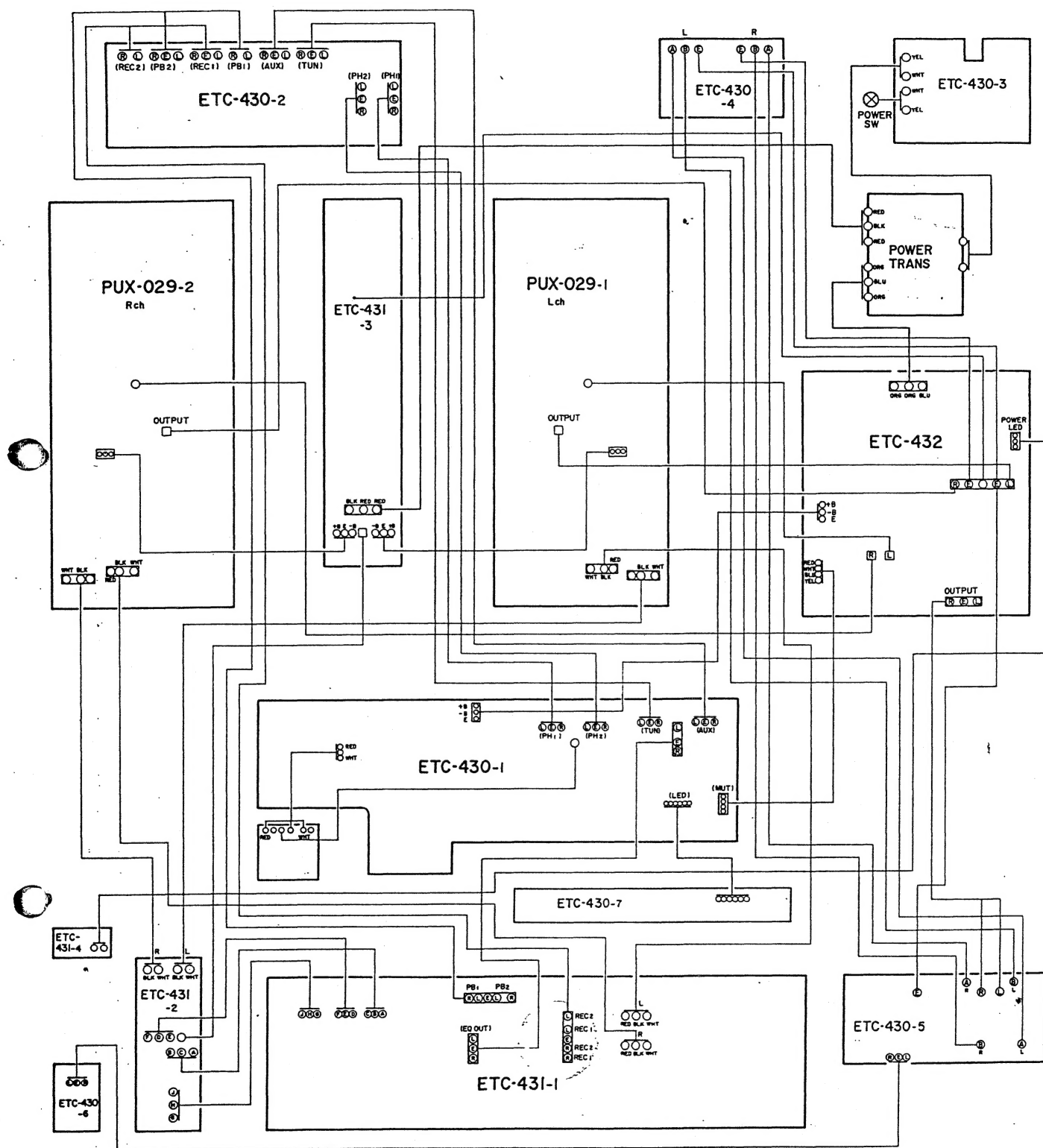
Power	→ OFF
Volume	→ ∞ dB (min.)
Direct couple	→ DIRECT
Speaker terminals	→ No load (no speaker connected)
3. Remove the top cover, and the VR1 500 ohm and VR2 500 ohm of the tone & power amp printed board (22207000071) fully counter clockwise. Connect a DC voltmeter to the test points.
4. Plug in the AC cord to power outlet of: Europe 220 V (209~231 V); U.K. and Australia 240 V (228~252 V); Canada and U.S.A. 120 V (114~126 V); and turn the power on. Immediately (about after ten seconds), turn VR1 and VR2 clockwise and adjust the test point voltage ( $V_{TP}$ ) to  $50 \pm 5$  mV preliminarily.
5. After about two or three minutes of the above preliminary adjustment, adjust VR1 and VR2 so as  $V_{TP}$  reads  $80 \pm 5$  mV.

## ADJUSTMENT OF EQUALIZER (ETC-430B PRINTED BOARD)

1. Insert short pins into PHONO input terminals.
2. Connect a digital voltmeter (0.01 mV ~ 1 mV DC range must be measurable) into each of REC. out terminals (L & R channels).
3. For easier measuring to avoid value fluctuation on the meter, connect a 100 k ohm (1/4W) resistor between the ends of the TP1/TP2 and TP3/TP4 on the printed board.
4. Set the FUNCTION switch to "MM" position, and turn the main volume to MIN.

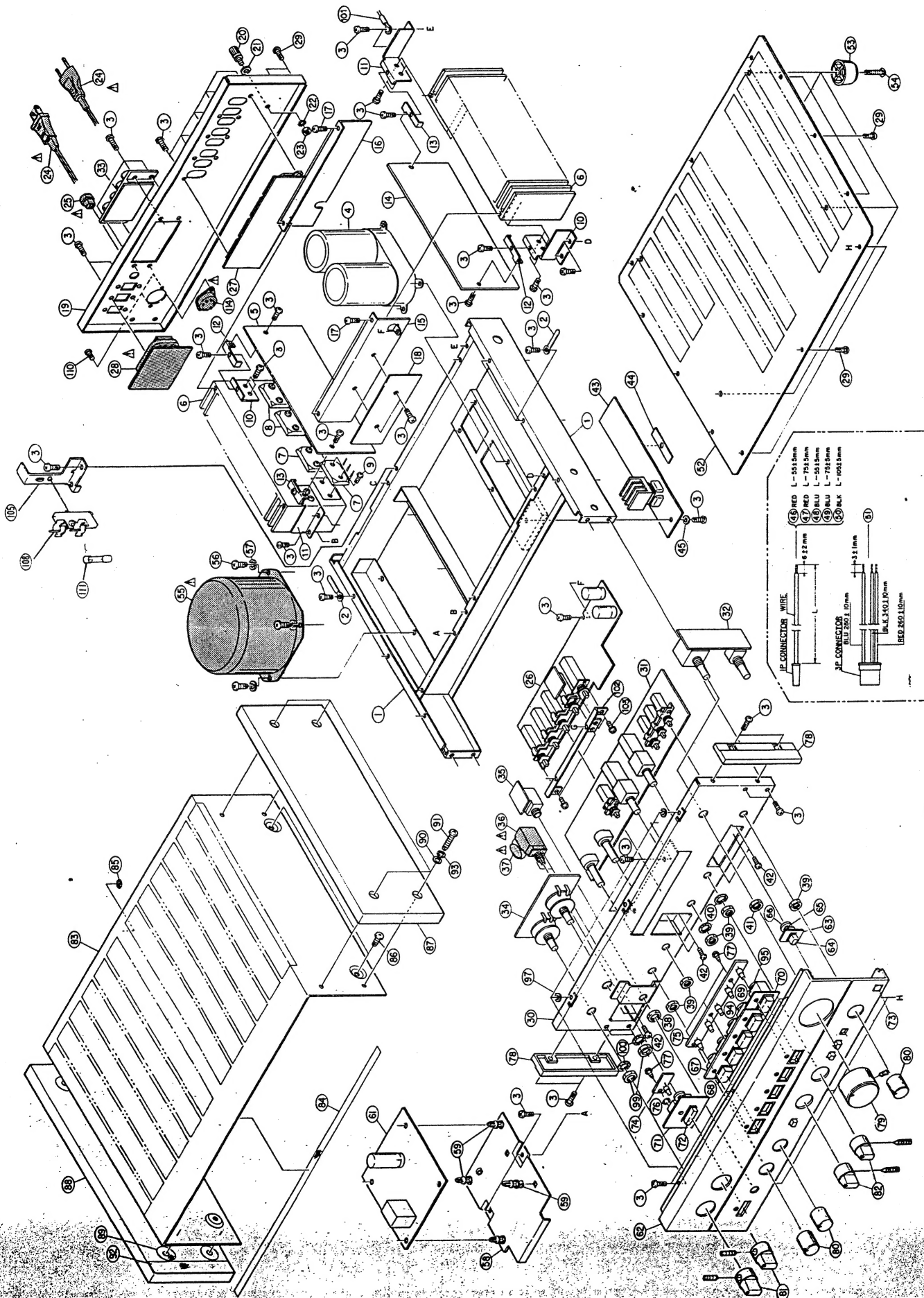
## ADJUSTMENT

1. Turn POWER on, and after two minutes warming-up conduct the following adjustments.
2. Adjust VR1 (100 k ohms Semi-Fixed Resistor), so as the L-channel digital voltmeter reads 0.5 mV DC or less.
3. Adjust VR2 (100 k ohms Semi-Fixed Resistor), so as the R-channel digital voltmeter reads 0.5 mV DC or less.



## EXPLODED VIEW OF CHASSIS AND CABINET

⚠ Means important safety item, which must be replaced, when necessary, by a part specified or meeting the specification by the manufacturer.



## EXPLODED VIEW OF PARTS LIST

Note1. See addendum list below for the parts with asterisk (\*) on the Ref. No. and the other parts not included in this list.

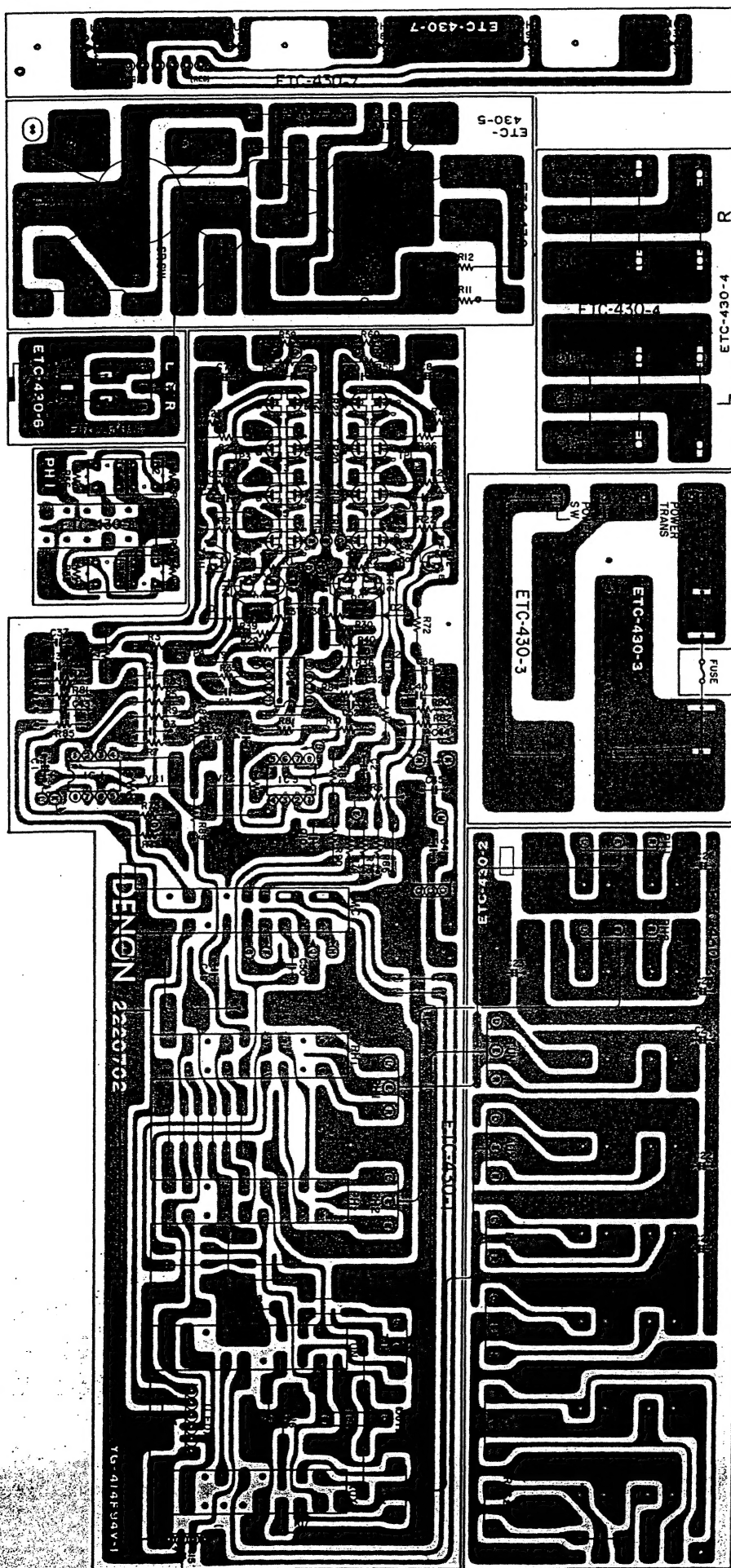
2. This list is prepared based on E1.

Ref. No.	Part No.	Part Name & Descriptions	Ref. No.	Part No.	Part Name & Descriptions
1	4110293004	MAIN CHASSIS ASS.	58	4120725300	BOARD BRACKET
2	EP-4772	CORD HOLDER	59	MD-5271	P.C.B. SUPPORT
3	4730354035	TAPPING SCREW (2)3x8	60	—	—
4	2546027008	CHEMICON 22000 $\mu$ Fx2 63 V	61	ETC-432	POWER SUPPLY & PROTECTOR UNIT
5	PUX-029-1	POWER AMP UNIT	62	1440825006	FRONT PANEL
6	4170139001	POWER RADIATOR	63	1140050003	PANEL BUSH
7	2710145020	TRANSISTOR 2SA1215LB(O)/(Y)	64	1130191105	PUSH KNOB
8	2730247021	TRANSISTOR 2SC2921LB(O)/(Y)	65	4630226014	SPRING
9	4700012022	CROSS PAN SCREW WITH S. WASHER 3x12	66	1190014002	STOPPER
10	4120871005	RADIATOR BRACKET (A)	67	1140054203	PANEL BUSH
11	4120872004	RADIATOR BRACKET (B)	68	1130259102	PUSH KNOB ASS.
12	4120873003	BRACKET (A)	69	4630246007	SPRING
13	4120874002	BRACKET (B)	70	1140057103	PANEL BUSH
14	PUX-029-2	POWER AMP (R) UNIT	71	1140051002	PANEL BUSH (C)
15	4140234208	SHIELD BRACKET (A)	72	1130192007	PUSH KNOB ASS.
16	4140235207	SHIELD BRACKET (B)	73	1350035012	MARK
17	4730353036	TAPPING SCREW (2)3x6 (BLACK)	74	ETC-431B-4	POWER LED UNIT
18	4140236002	SHIELD PLATE	75	ETC-430B-7	INPUT LED UNIT (POWER LED)
*19	1050411004	BACK PANEL	76	4770063108	INSULATING WASHER
20	2050043109	GND TERMINAL	77	4730304014	TAPPING SCREW (1)3x8
21	4770088002	$\phi$ 4.1 WASHER	78	1460283110	ESC. PLATE
22	4753100004	$\phi$ 4 TOOTH WASHER	79	1120333106	KNOB (VOLUME)
23	4770006000	M4 NUT	80	1120334008	KNOB (BALANCE, TONE)
24	2005091026	AC CORD	81	1120335007	KNOB (SPEAKER)
25	MD-5812	BUSHING	82	1120336006	KNOB (TAPE)
26	ETC-430B-1	INPUT & EQ-UNIT (EQ.)	83	1020120008	TOP COVER
27	ETC-430B-2	INPUT & EQ-UNIT (INPUT)	84	1220069008	SPACER
28	ETC-430B-3	INPUT & EQ-UNIT (OUTLET)	85	1040034006	STOPPER
29	4770064107	FIXING SCREW	86	4734801005	TAPPING SCREW TRUS 4x8
30	4110291103	FRONT CHASSIS	87	1011145005	WOOD BOARD (R)
31	ETC-431B-1	CONTROL UNIT (CONTROL)	88	1011146004	WOOD BOARD (L)
32	ETC-431B-2	CONTROL UNIT (VOLUME)	89	1240032015	FELT SHEET
33	ETC-430B-4	INPUT & EQ. UNIT (SPEAKER TERMINAL)	90	4751006016	$\phi$ 5 WASHER (BLACK)
34	ETC-430B-5	INPUT & EQ. UNIT (SPEAKER SWITCH)	91	4734460035	TAPPING SCREW TRUS 4x20
35	ETC-430B-6	INPUT & EQ. UNIT (HEADPHONE)	92	1220069037	SPACER
36	2124263022	PUSH SWITCH	93	4751006016	$\phi$ 4 SPRING WASHER
37	2538003013	CERAMIC CAPACITOR 0.0047 $\mu$ F 400 V	94	4610167009	CUSHION
38	—	M12 NUT (SPARE)	95	4610156023	SPACER
39	—	M7 NUT (SPARE)	96	—	—
40	—	$\phi$ 7 TOOTH WASHER (SPARE)	97	—	—
41	—	M8 NUT (SPARE)	98	—	—
42	4711303018	CROSS PAN SCREW 3x6	99	—	M9 NUT (SPARE)
43	ETC-431B-3	CONTROL UNIT (RECT)	100	—	$\phi$ 9 TOOTH WASHER (SPARE)
44	2050125001	EARTH PLATE	101	2050003000	3T LUG (ETC-430B)
45	4751003006	$\phi$ 3 WASHER	102	4120875001	5P SWITCH BRACKET (ETC-430B)
46	2030222005	1P CONNECTOR CORD (Lch, +B)	103	4700009006	CROSS PAN SCREW WITH S. WASHER 3x6 (ETC-430B)
47	2030222018	1P CONNECTOR CORD (Rch, +B)	104	—	—
48	2030222021	1P CONNECTOR CORD (Rch, -B)	105	4120892000	BRACKET (A)
49	2030222034	1P CONNECTOR CORD (Lch, -B)	106	—	—
50	2030222047	1P CONNECTOR CORD (E)	107	4150173003	INSULATING SHEET
51	—	—	108	2020011006	FUSE HOLDER
52	1050336215	BOTTOM COVER	109	4120238101	BRACKET
53	1040027107	FOOT	110	4711303034	CROSS PAN SCREW 3x6 (BLACK)
54	4739051009	CROSS PAN SCREW WITH WASHER 3x20	*111	2061025093	FUSE 125V 4A TIME LAG TYPE
55	2335304000	POWER TRANS	112	5130159185	FUSE LABEL (T.4.0A)
56	4730455031	TAPPING SCREW (2) 4x10	113	2048070003	5P CONNECTOR (DIN)
57	4752004004	$\phi$ 4 SPRING WASHER	114	2120186006	VOL. PAGE SELECTOR SWITCH
			PACKING & ACCESSORIES		
			5040055007	CABINET SHEET	
			5030281001	CUSHION	
			5010755007	CARTON CASE	
			5110919002	INST. MANUAL	

## ADDENDUM LIST

Ref. No.	Part Name	Part No.		Ref. No.	Part Name	Part No.	
		E2 For Europe	E3 For USA, EC For Canada			E2 For Europe	E3 For USA, EC For Canada
19	BACK PANEL	1050434007	—	75	INPUT & EQ-UNIT (POWER LED)	ETC-430D-7	ETC-430B-7
26	INPUT & EQ-UNIT (EQ.)	ETC-430D-1	ETC-430B-1	115	INSULATING SHEET	4150088004	—
27	INPUT & EQ-UNIT (INPUT)	ETC-430D-2	ETC-430B-2	116	7PW TERMINAL	2050089008	—
33	INPUT & EQ-UNIT (SPEAKER)	ETC-430D-4	ETC-430B-4	117	C. PAN SCREW WITH S. W. 3x8	4700042005	—
34	INPUT & EQ-UNIT (SP. SWITCH)	ETC-430D-5	ETC-430B-5	118	M3 NUT	4756006008	—
35	INPUT & EQ-UNIT (H. PHONE)	ETC-430D-6	ETC-430B-6	119	FUSE	2061015087 (4A)	—
				120	C. SCREW WITH S. W 3x8 (BLACK)	4700042005	—
					FUSE LABEL	5130622010 (T.8.0A)	—

**PRINTED CIRCUIT BOARD PATTERNS AND PARTS LIST**  
**INPUT & EQ. UNIT ETC-430B**



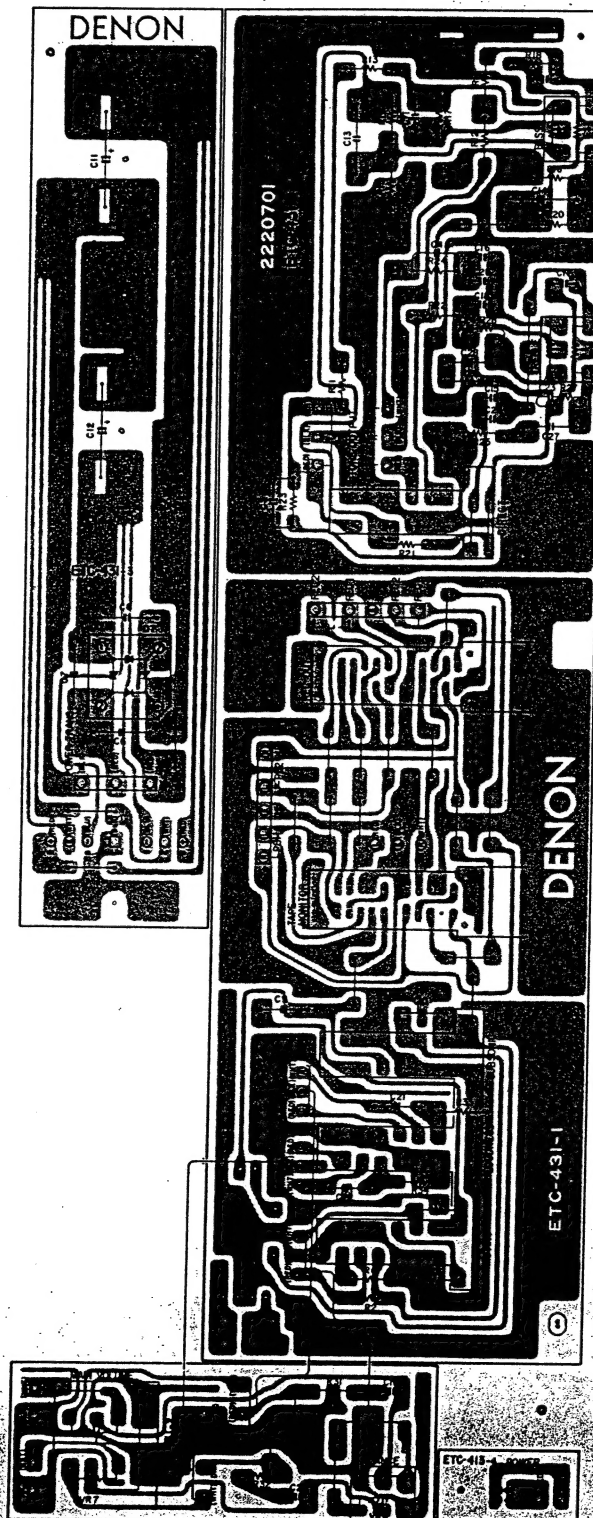
## ETC-430B PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions	
SEMICONDUCTORS			
IC01	2630133002	$\mu$ PC741C	INTEGRATED CIRCUIT
IC02	2630118001	NJM4560D	INTEGRATED CIRCUIT
IC03	2630133002	$\mu$ PC741C	INTEGRATED CIRCUIT
TR03	2730198031	2SC1815(BL)/(GR)	TRANSISTOR
TR04	2730198031	2SC1815(BL)/(GR)	TRANSISTOR
TR05	2730198031	2SC1815(BL)/(GR)	TRANSISTOR
TR06	2730198031	2SC1815(BL)/(GR)	TRANSISTOR
TR11	2710102034	2SA1015(Y)/(GR)	TRANSISTOR
TR12	2710102034	2SA1015(Y)/(GR)	TRANSISTOR
TR15	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR16	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR17	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR18	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR19	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR20	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR21	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
TR22	2750029041	2SK240(GR)/(BL)	FIELD EFFECT TRANSISTOR
D01	2760185001	HZ-4-B3	DIODE
D02	2760185001	HZ-4-B3	DIODE
D03	3939091006	TLY206(YELLOW)	LIGHT EMITTING DIODE
D06	3939040002	TLG206 (GREEN)	LIGHT EMITTING DIODE
D07	3939040002	TLG206 (GREEN)	LIGHT EMITTING DIODE
D08	3939040002	TLG206 (GREEN)	LIGHT EMITTING DIODE
D09	3939040002	TLG206 (GREEN)	LIGHT EMITTING DIODE
RESISTORS			
VR01	2116025032	SEMI FIXED RESISTOR 100 k ohm	
VR02	2116025032	SEMI FIXED RESISTOR 100 k ohm	
R01	2412092002	1 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R02	2412092002	1 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R03	2412116001	10 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R04	2412116001	10 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R05	2412112005	6.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R06	2412112005	6.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R07	2412116001	10 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R08	2412116001	10 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R09	2412123007	20 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R10	2412123007	20 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R11	2440078027	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	METAL OXIDE FILM
R12	2440078027	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	METAL OXIDE FILM
R13	2440078027	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	METAL OXIDE FILM
R14	2440078027	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	METAL OXIDE FILM
R15	2412092002	1 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R16	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R17	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R18	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R19	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R21	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R22	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R23	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R24	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R25	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R26	2412098006	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R27	2412020016	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R28	2412020016	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R29	2412020016	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R30	2412020016	1.8 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R35	2412076002	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R36	2412076002	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R37	2412022043	22 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R38	2412022043	22 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R39	2412022043	22 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R40	2412022043	22 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R53	2412002005	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R54	2412002005	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R55	2412002005	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R56	2412002005	220 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R57	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R58	2412068007	100 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R59	2412133000	51 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R60	2412133000	51 k ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R73	2412067008	91 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R74	2412067008	91 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R75	2412108006	4.7 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R76	2412108006	4.7 ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R77	2412312009	7.5 M ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R78	2412312009	2.7 M ohm $\pm 5\%$ $\frac{1}{4}$ W	CARBON FILM
R79	2412106008	3.9 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R80	2412106008	3.9 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R81	2412132001	47 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R82	2412132001	47 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R83	2412060005	47 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R84	2412060005	47 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R85	2412155004	430 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R86	2412155004	430 k ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R87	2412068007	100 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R88	2412068007	100 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R89	2412068007	100 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
R90	2412068007	100 ohm $\pm 2\%$ $\frac{1}{4}$ W	CARBON FILM
CAPACITORS			
C01	2544003008	100 $\mu$ F	6.3VELECTROLYTIC
C02	2544003008	100 $\mu$ F	6.3VELECTROLYTIC
C03	2561017019	0.01 $\mu$ F $\pm 10\%$	630V METALIZED
C04	2561017019	0.01 $\mu$ F $\pm 10\%$	630V METALIZED
C07	2544013001	470 $\mu$ F	10V ELECTROLYTIC
C08	2544013001	470 $\mu$ F	10V ELECTROLYTIC
C09	2556160078	0.0068 $\mu$ F $\pm 5\%$	50V PLASTIC FILM FORMING
C10	2556160078	0.0068 $\mu$ F $\pm 5\%$	50V PLASTIC FILM FORMING
C15	2544044009	1 $\mu$ F	50V ELECTROLYTIC
C21	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C22	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C23	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C24	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C25	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C26	2544043000	0.47 $\mu$ F	50V ELECTROLYTIC
C29	2556159018	120pF $\pm 5\%$	50V PLASTIC FILM FORMING
C30	2556159018	120pF $\pm 5\%$	50V PLASTIC FILM FORMING
C31	2554149004	0.0015 $\mu$ F $\pm 5\%$	50V PLASTIC FILM
C32	2554149004	0.0015 $\mu$ F $\pm 5\%$	50V PLASTIC FILM
C35	2541035008	1 $\mu$ F $\pm 20\%$	35V ELECTROLYTIC
C36	2541035008	1 $\mu$ F $\pm 20\%$	35V ELECTROLYTIC
C37	2554070018	0.001 $\mu$ F $\pm 1\%$	100V PLASTIC FILM
C38	2554070018	0.001 $\mu$ F $\pm 1\%$	100V PLASTIC FILM
C39	2554083034	0.018 $\mu$ F $\pm 2\%$	100V PLASTIC FILM
C40	2554083034	0.018 $\mu$ F $\pm 2\%$	100V PLASTIC FILM
C41	2544038002	100 $\mu$ F	35V ELECTROLYTIC
C43	2554083047	0.068 $\mu$ F $\pm 2\%$	100V PLASTIC FILM
C44	2554083047	0.068 $\mu$ F $\pm 2\%$	100V PLASTIC FILM
C45	2544038002	100 $\mu$ F	35V ELECTROLYTIC
C49	2556160081	0.0075 $\mu$ F $\pm 5\%$	50V PLASTIC FILM FORMING
C50	2556160081	0.0075 $\mu$ F $\pm 5\%$	50V PLASTIC FILM FORMING
C51	2556159092	470pF $\pm 5\%$	50V PLASTIC FILM FORMING
C52	2556159092	470pF $\pm 5\%$	50V PLASTIC FILM FORMING
C55	2544044009	1 $\mu$ F	50V ELECTROLYTIC
C56	2544044009	1 $\mu$ F	50V ELECTROLYTIC
OTHER PARTS			
SW01	2220702102	P.W. BOARD	
SW02	2090047903	0.6 JUMPER WIRE SHORTLEAD USED 25	
SW03	2090008133	JUMPER SHOTLEAD USED 11	
	EP-6667H1	TERMINAL WRAPPING PIN USED 8	
	2120187005	ROTARY SWITCH FOR SPEAKER	
	2120188004	ROTARY SWITCH FOR H.P. IMPEDANCE	
	2124290008	4P. PUSH SWITCH FOR FUNCTION	

(Con.)

Ref. No.	Part No.	Part Name & Descriptions	Ref. No.	Part No.	Part Name & Description
SW04	2124291007	1P. PUSH SWITCH FOR MC~MM	L01	2034152029	3P. CONTACT WIRE ASS. FOR TON
	2033909008	AC OUTLET		2034152032	3P. CONTACT WIRE ASS. FOR AUX
	2050070004	8P. TERMINAL FOR SPEAKER		2038092004	5P. CONNECTOR CORD FOR REC
	EP-5870	FUSE HOLDER USED 2		2038093003	5P. CONNECTOR CORD FOR PB
	2061017027	FUSE 8A		2040075019	6P. CONNECTOR CORD FOR LED
	2048045009	4P. PIN JACK		4120875001	5P. SWITCH BRACKET
	2048078005	4P. CONNECTOR BASE ASS.		4700009006	CROSS PAN SCREW WITH S. WASHER 3x6
	2050122033	3P. CONNECTOR PIN ASS.		4450033005	WIRE CLAMP BAND
	2035622024	4P. MINI CONN. PIN		2318017000	INDUCTOR
	2035622008	3P. CONN. BASE		2318017000	INDUCTOR
	2035622082	6P. CONN. BASE		2318017000	INDUCTOR
	2050003000	3T LUG		2318017000	INDUCTOR
	2034152003	3P. CONTACT WIRE ASS. FOR PH1			
	2034152016	3P. CONTACT WIRE ASS. FOR PH2			

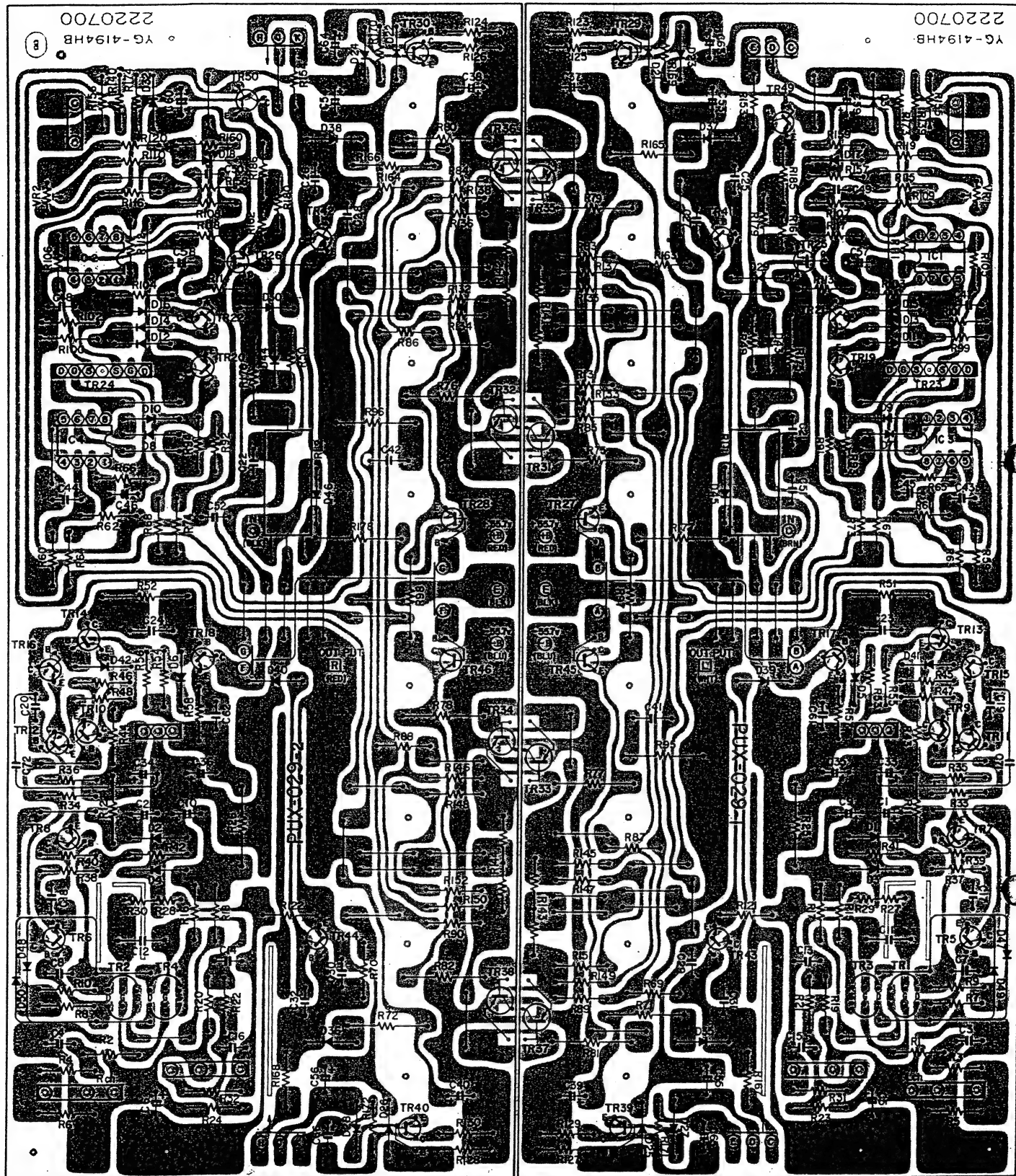
## CONTROL UNIT ETC-431B



## ETC-431B PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions	Ref. No.	Part No.	Part Name & Descriptions
SEMICONDUCTORS			OTHER PARTS		
D04	3939032007	TLR206(RED) LIGHT EMITTING DIODE	SW01 SW02 SW03 SW04	2220701006	P.W. BOARD
D07	2760312007	S10VB20F DIODE		2090047903	0.6 JUMPER WIRE USED 23
RESISTORS				EP-5667H1	TERMINAL FOR WRAPPING PIN USED 1
VR03	2110278005	VARIABLE RESISTOR 100 k ohm (FOR BASS)		2050087039	3P. TERMINAL USED 1
VR05	2110277006	VARIABLE RESISTOR 50 k ohm (FOR TREBLE)		2050122059	5P. CONNECTOR PIN ASS.
VR06	2110256108	VARIABLE RESISTOR 100 k ohm (FOR BALANCE)		2124288007	1P. PUSH SWITCH FOR DIRECT
VR07	2110276007	VARIABLE RESISTOR 55 k ohm (FOR MAIN VR)		2120190005	ROTARY SWITCH (A) FOR REC OUT
R01	2412130003	39 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2120189003	ROTARY SWITCH (B) FOR MONITOR
R02	2412130003	39 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2124289006	3P. PUSH SWITCH FOR SUB. LOUD, MUT.
R03	2412108006	4.7 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2034147005	3P. CONNECTOR CORD FOR +B,E,-B
R04	2412108006	4.7 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2034149016	3P. CONNECTOR CORD FOR EQ OUT
R09	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$ CARBON COMPOSIT		2034150021	3P. CONNECTOR CORD FOR TONE OUT (L)
R10	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$ CARBON COMPOSIT		2034150034	3P. CONNECTOR CORD FOR TONE OUT (R)
R11	2412084007	470 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2034156009	3P. CONNECTOR CORD FOR VOL OUT (L)
R12	2412084007	470 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2034156012	3P. CONNECTOR CORD FOR VOL OUT (R)
R13	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		2034146019	3P. CONNECTOR CORD FOR POWER LED
R14	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM		4140062001	SHIELD PLATE
R15	2412094000	1.2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R16	2412094000	1.2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R17	2412138005	82 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R18	2412138005	82 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R19	2412115002	9.1 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R20	2412115002	9.1 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R21	2412063002	62 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R22	2412063002	62 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R23	2412099005	2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R24	2412099005	2 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R25	2412079009	300 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R26	2412079009	300 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R27	2412084007	470 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R28	2412084007	470 ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R31	2412120000	15 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R32	2412120000	15 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R33	2412103001	3 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
R34	2412103001	3 k ohm $\pm 5\%$ $\frac{1}{4}W$ CARBON FILM			
CAPACITORS					
C03	2554127000	180pF $\pm 5\%$ 50V PLASTIC FILM			
C04	2554127000	180pF $\pm 5\%$ 50V PLASTIC FILM			
C05	2561016007	0.068 $\mu$ F $\pm 10\%$ 400V METALIZED			
C06	2561016007	0.068 $\mu$ F $\pm 10\%$ 400V METALIZED			
C07	2561016007	0.068 $\mu$ F $\pm 10\%$ 400V METALIZED			
C08	2561016007	0.068 $\mu$ F $\pm 10\%$ 400V METALIZED			
C09	2554082048	0.18 $\mu$ F $\pm 5\%$ 100V PLASTIC FILM			
C10	2554082048	0.18 $\mu$ F $\pm 5\%$ 100V PLASTIC FILM			
C11	2554183002	0.039 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C12	2554183002	0.039 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C13	2554082080	0.27 $\mu$ F $\pm 5\%$ 100V PLASTIC FILM			
C14	2554082080	0.27 $\mu$ F $\pm 5\%$ 100V PLASTIC FILM			
C15	2554161008	0.0047 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C16	2554161008	0.0047 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C17	2554127000	180pF $\pm 5\%$ 50V PLASTIC FILM			
C18	2554127000	180pF $\pm 5\%$ 50V PLASTIC FILM			
C19	2554142001	750pF $\pm 5\%$ 50V PLASTIC FILM			
C20	2554142001	750pF $\pm 5\%$ 50V PLASTIC FILM			
C21	2554193005	0.1 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C22	2554193005	0.1 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C23	2554147006	0.0012 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C24	2554147006	0.0012 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C25	2554155001	0.0027 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C26	2554155001	0.0027 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C27	2554187008	0.056 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			
C28	2554187008	0.056 $\mu$ F $\pm 5\%$ 50V PLASTIC FILM			

**POWER AMP UNIT PUS-029**



## PUS-029 PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions	
SEMICONDUCTORS			
IC01	2630081002	NJM4558D	INTEGRATED CIRCUIT
IC02	2630081002	NJM4558D	INTEGRATED CIRCUIT
IC03	2630081002	NJM4558D	INTEGRATED CIRCUIT
IC04	2630081002	NJM4558D	INTEGRATED CIRCUIT
TR01	2750022035	2SK129A(K)/(L)	FIELD EFFECT TRANSISTOR
TR02	2750022035	2SK129A(K)/(L)	FIELD EFFECT TRANSISTOR
TR03	2750022035	2SK129A(K)/(L)	FIELD EFFECT TRANSISTOR
TR04	2750022035	2SK129A(K)/(L)	FIELD EFFECT TRANSISTOR
TR05	2730235020	2SC1841(F)/(E)	TRANSISTOR
TR06	2730235020	2SC1841(F)/(E)	TRANSISTOR
TR07	2730235020	2SC1841(F)/(E)	TRANSISTOR
TR08	2730235020	2SC1841(F)/(E)	TRANSISTOR
TR09	2710102005	2SA1015(Y)	TRANSISTOR
TR10	2710102005	2SA1015(Y)	TRANSISTOR
TR11	2710102005	2SA1015(Y)	TRANSISTOR
TR12	2710102005	2SA1015(Y)	TRANSISTOR
TR13	2710110000	2SA916(L)	TRANSISTOR
TR14	2710110000	2SA916(L)	TRANSISTOR
TR15	2710110000	2SA916(L)	TRANSISTOR
TR16	2710110000	2SA916(L)	TRANSISTOR
TR17	2730205005	2SC1941(L)	TRANSISTOR
TR18	2730205005	2SC1941(L)	TRANSISTOR
TR19	2730198015	2SC1815(BL)	TRANSISTOR
TR20	2730198015	2SC1815(BL)	TRANSISTOR
TR21	2730198015	2SC1815(BL)	TRANSISTOR
TR22	2730198015	2SC1815(BL)	TRANSISTOR
TR23	2750024059	$\mu$ PA68H(M)/(N)	FIELD EFFECT TRANSISTOR
TR24	2750024059	$\mu$ PA68H(M)/(N)	FIELD EFFECT TRANSISTOR
TR25	2750020024	2SK163(M)/(N)	FIELD EFFECT TRANSISTOR
TR26	2750020024	2SK163(M)/(N)	FIELD EFFECT TRANSISTOR
TR27	2730199027	2SC2238(Y)/(O)	TRANSISTOR
TR28	2730199027	2SC2238(Y)/(O)	TRANSISTOR
TR29	2740060007	2SD667A(C)	TRANSISTOR
TR30	2740060007	2SD667A(C)	TRANSISTOR
TR31	2730247021	2SC2921 LB(O)/(Y)	TRANSISTOR
TR32	2730247021	2SC2921 LB(O)/(Y)	TRANSISTOR
TR33	2710145020	2SA1215LB(O)/(H)	TRANSISTOR
TR34	2710145020	2SA1215LB(O)/(Y)	TRANSISTOR
TR35	2730247021	2SC2921 LB(O)/(Y)	TRANSISTOR
TR36	2730247021	2SC2921 LB(O)/(Y)	TRANSISTOR
TR37	2710145020	2SA1215LB(O)/(Y)	TRANSISTOR
TR38	2710145020	2SA1215LB(O)/(Y)	TRANSISTOR
TR39	2720053005	2SB647A(C)	TRANSISTOR
TR40	2720053005	2SB647A(C)	TRANSISTOR
TR41	2730198002	2SC1815(Y)	TRANSISTOR
TR42	2730198002	2SC1815(Y)	TRANSISTOR
TR43	2710102005	2SA1015(Y)	TRANSISTOR
TR44	2710102005	2SA1015(Y)	TRANSISTOR
TR45	2710104029	2SA968(Y)/(O)	TRANSISTOR
TR46	2710104029	2SA968(Y)/(O)	TRANSISTOR
TR49	2710102005	2SA1015(Y)	TRANSISTOR
TR50	2710102005	2SA1015(Y)	TRANSISTOR
D01	2760219003	HZ-15	DIODE
D02	2760219003	HZ-15	DIODE
D03	2760219003	HZ-15	DIODE
D04	2760219003	HZ-15	DIODE
D05	2760171028	HV-23G(YL)	DIODE
D06	2760171028	HV-23G(YL)	DIODE
D07	2760049008	1S2076	DIODE
D08	2760049008	1S2076	DIODE
D09	2760049008	1S2076	DIODE
D10	2760049008	1S2076	DIODE
D11	2760049008	1S2076	DIODE
D12	2760049008	1S2076	DIODE
D13	2760049008	1S2076	DIODE
D14	2760049008	1S2076	DIODE
D15	2760216019	KB-265	DIODE
D16	2760216019	KB-265	DIODE
D17	2760049008	1S2076	DIODE
D18	2760049008	1S2076	DIODE
D21	2760254000	HZ-7B-3	DIODE
D22	2760254000	HZ-7B-3	DIODE
D23	2760049008	1S2076	DIODE
D24	2760049008	1S2076	DIODE
D25	2760254000	HZ7B-3	DIODE
D26	2760254000	HZ7B-3	DIODE
D27	2760049008	1S2076	DIODE
D28	2760049008	1S2076	DIODE
D29	2760049011	1S2076A	DIODE
D30	2760049011	1S2076A	DIODE
D31	2760049008	1S2076	DIODE
D32	2760049008	1S2076	DIODE
D35	2760049011	1S2076A	DIODE
D36	2760049011	1S2076A	DIODE
D37	2760049011	1S2076A	DIODE
D38	2760049011	1S2076A	DIODE
D39	2760049011	1S2076A	DIODE
D40	2760049011	1S2076A	DIODE
D41	2760244007	MZ303A	DIODE
D42	2760244007	MZ303A	DIODE
D43	2760177006	MZ-306	DIODE
D44	2760177006	MZ-036	DIODE
D45	2760049011	1S2076A	DIODE
D46	2760049011	1S2076A	DIODE
D47	2760049008	1S2076	DIODE
D48	2760049008	1S2076	DIODE
D49	2760049008	1S2076	DIODE
D50	2760049008	1S2076	DIODE
RESISTORS			
VR01	2116014043	SEMI FIXED RESISTOR 500 ohm	
VR02	2116014043	SEMI FIXED RESISTOR 500 ohm	
R05	2412157002	510 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R06	2412157002	510 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R07	2412318029	4.7 k ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R08	2412318029	4.7 k ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R09	2412318029	4.7 k ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R10	2412318029	4.7 k ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R11	2442002020	7.5 k ohm $\pm 5\%$ 1W	METAL OXIDE FILM
R12	2442002020	7.5 k ohm $\pm 5\%$ 1W	METAL OXIDE FILM
R15	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R16	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R17	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R18	2412114003	8.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R21	2412111006	6.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R22	2412111006	6.2 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R23	2412134009	56 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R24	2412134009	56 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R27	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$	CARBON COMPOSIT
R28	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$	CARBON COMPOSIT
R29	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$	CARBON COMPOSIT
R30	2420203003	10 M ohm $\pm 10\%$ $\frac{1}{4}W$	CARBON COMPOSIT
R31	2412130003	39 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON COMPOSIT
R32	2412130003	39 k ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R35	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R36	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R37	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R38	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R39	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R40	2412315030	430 ohm $\pm 2\%$ $\frac{1}{4}W$	CARBON FILM
R45	2412044005	10 ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R46	2412044005	10 ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R47	2412044005	10 ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM
R48	2412044005	10 ohm $\pm 5\%$ $\frac{1}{4}W$	CARBON FILM

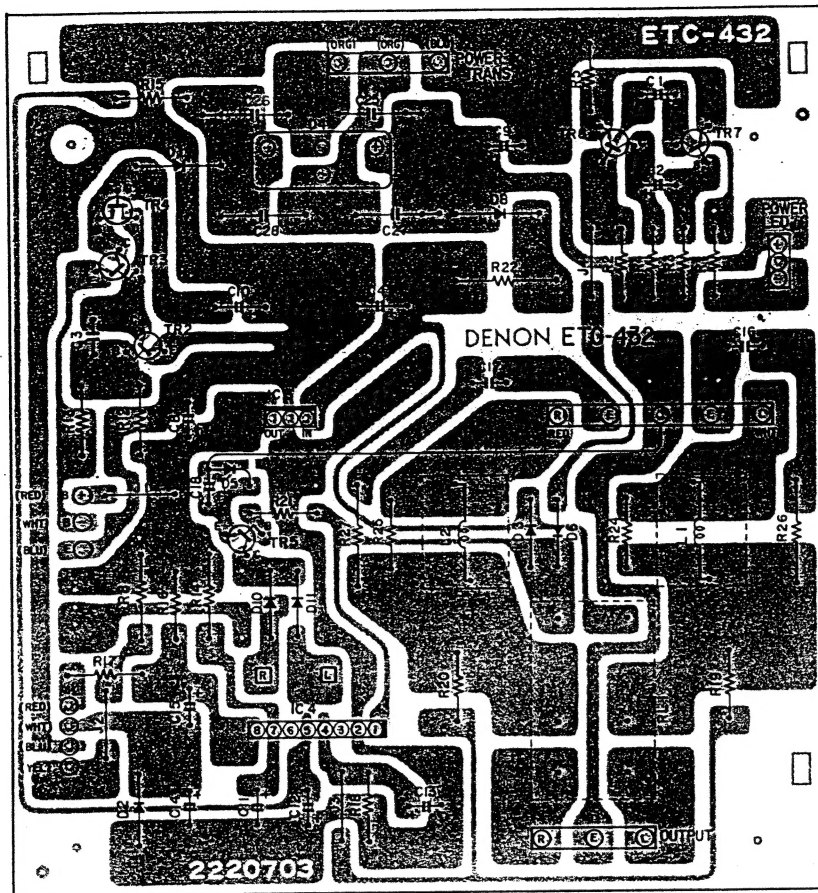
(Con.)

Ref. No.	Part No.	Part Name & Descriptions				Ref. No.	Part No.	Part Name & Descriptions			
Δ R49	2412310017	750 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R121	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R50	2412310017	750 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R122	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R51	2410040025	68 k ohm	±5%	1W	METAL OXIDE FILM	Δ R123	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R52	2410040025	68 k ohm	±5%	1W	METAL OXIDE FILM	Δ R124	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R53	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R125	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R54	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R126	2412310038	47 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R55	2412310038	470 k ohm	±5%	¼W	CARBON FILM FUSIBLE	Δ R127	2412310038	10 k ohm	±5%	¼W	CARBON FILM FUSIBLE
Δ R56	2412310038	270 k ohm	±5%	¼W	CARBON FILM FUSIBLE	Δ R128	2412310038	10 k ohm	±5%	¼W	CARBON FILM FUSIBLE
Δ R57	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R129	2412310038	470 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R58	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R130	2412310038	470 ohm	±2%	¼W	CARBON FILM FUSIBLE
R59	2412131002	43 k ohm	±5%	¼W	CARBON FILM	Δ R131	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R60	2412131002	43 k ohm	±5%	¼W	CARBON FILM	Δ R132	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R61	2412121009	16 k ohm	±5%	¼W	CARBON FILM	Δ R133	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R62	2412121009	16 k ohm	±5%	¼W	CARBON FILM	Δ R134	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R63	2412131002	43 k ohm	±5%	¼W	CARBON FILM	Δ R135	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R64	2412131002	43 k ohm	±5%	¼W	CARBON FILM	Δ R136	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R65	2412121009	16 k ohm	±5%	¼W	CARBON FILM	Δ R137	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R66	2412121009	16 k ohm	±5%	¼W	CARBON FILM	Δ R138	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R67	2412113004	7.5 k ohm	±5%	¼W	CARBON FILM	Δ R139	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
R68	2412113004	7.5 k ohm	±5%	¼W	CARBON FILM	Δ R140	2412310038	100 ohm	±2%	¼W	CARBON FILM FUSIBLE
Δ R69	2412310038	120 ohm	±2%	¼W	CARBON FILM FUSIBLE	Δ R141	2432026029	1 ohm/1 ohm	±10%	3.15W	WIRE WOUND
Δ R70	2412310038	120 ohm	±2%	¼W	CARBON FILM FUSIBLE	R142	2432026029	1 ohm/1 ohm	±10%	3.15W	WIRE WOUND
Δ R71	2410040025	1 k ohm	±5%	1W	METAL OXIDE FILM	R143	2432026029	1 ohm/1 ohm	±10%	3.15W	WIRE WOUND
Δ R72	2410040025	1 k ohm	±5%	1W	METAL OXIDE FILM	R144	2432026029	1 ohm/1 ohm	±10%	3.15W	WIRE WOUND
R73	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM	Δ R145	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
R74	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM	Δ R146	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R75	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R147	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R76	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R148	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R77	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R149	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R78	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R150	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R79	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R151	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R80	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	Δ R152	2412310038	100 ohm	±2%	3.15W	WIRE WOUND FUSIBLE
Δ R81	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	R153	2412116001	10 k ohm	±5%	3.15W	WIRE WOUND
Δ R82	2410040025	47 ohm	±5%	¼W	METAL OXIDE FILM	R154	2412116001	10 k ohm	±5%	3.15W	WIRE WOUND
Δ R83	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R155	2412068007	100 ohm	±5%	3.15W	WIRE WOUND
Δ R84	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R156	2412068007	100 ohm	±5%	3.15W	WIRE WOUND
Δ R85	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R157	2412092002	1 k ohm	±5%	3.15W	WIRE WOUND
Δ R86	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R158	2412092002	1 k ohm	±5%	3.15W	WIRE WOUND
Δ R87	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R159	2412108006	4.7 k ohm	±5%	3.15W	WIRE WOUND
Δ R88	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R160	2412108006	4.7 k ohm	±5%	3.15W	WIRE WOUND
Δ R89	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R161	2790006011	100 ohm (112101-2)			
Δ R90	2412315035	33 ohm	±2%	¼W	METAL OXIDE FILM FUSIBLE	R162	2790006011	100 ohm (112101-2)			
R91	2412128002	33 k ohm	±5%	¼W	METAL OXIDE FILM	Δ R163	2412310038	120 ohm	±5%	¼W	CARBON FILM FUSIBLE
R92	2412128002	33 k ohm	±5%	¼W	METAL OXIDE FILM	Δ R164	2412310038	120 ohm	±5%	¼W	CARBON FILM FUSIBLE
R93	2412128002	33 k ohm	±5%	¼W	METAL OXIDE FILM	Δ R165	2410040025	1 k ohm	±5%	1W	METAL OXIDE FILM
R94	2412128002	33 k ohm	±5%	¼W	METAL OXIDE FILM	Δ R166	2410040025	1 k ohm	±5%	1W	METAL OXIDE FILM
Δ R95	2410040025	27 ohm	±5%	¼W	METAL OXIDE FILM	R167	2412116001	10 k ohm	±5%	¼W	CARBON FILM
Δ R96	2410040025	27 ohm	±5%	¼W	METAL OXIDE FILM	R168	2412116001	10 k ohm	±5%	¼W	CARBON FILM
Δ R97	2410040025	220 ohm	±5%	¼W	METAL OXIDE FILM	R169	2412130003	39 k ohm	±5%	¼W	CARBON FILM
Δ R98	2410040025	220 ohm	±5%	¼W	METAL OXIDE FILM	R170	2412130003	39 k ohm	±5%	¼W	CARBON FILM
R99	2412155004	430 k ohm	±5%	¼W	CARBON FILM	R171	2412130003	39 k ohm	±5%	¼W	CARBON FILM
R100	2412155004	430 k ohm	±5%	¼W	CARBON FILM	R172	2412130003	39 k ohm	±5%	¼W	CARBON FILM
R101	2420195001	2.2 M ohm	±10%	¼W	CARBON COMPOSIT	R173	2412108006	4.7 k ohm	±5%	¼W	CARBON FILM
R102	2420195001	2.2 M ohm	±10%	¼W	CARBON COMPOSIT	R174	2412108006	4.7 k ohm	±5%	¼W	CARBON FILM
R103	2412164008	1 M ohm	±5%	¼W	CARBON FILM	R175	2440037026	470 ohm	±5%	1W	METAL OXIDE FILM
R104	2412164008	1 M ohm	±5%	¼W	CARBON FILM	R176	2440037026	470 ohm	±5%	1W	METAL OXIDE FILM
R105	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM	R177	2440044022	1.8 k ohm	±5%	1W	METAL OXIDE FILM
R106	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM	R178	2440044022	1.8 k ohm	±5%	1W	METAL OXIDE FILM
R107	2412128002	33 k ohm	±5%	¼W	CARBON FILM						
R108	2412128002	33 k ohm	±5%	¼W	CARBON FILM						
R109	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM						
R110	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM						
R111	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM						
R112	2412112005	6.8 k ohm	±5%	¼W	CARBON FILM						
R113	2412132001	47 k ohm	±5%	¼W	CARBON FILM						
R114	2412132001	47 k ohm	±5%	¼W	CARBON FILM						
R115	2412108006	4.7 k ohm	±5%	¼W	CARBON FILM						
R116	2412108006	4.7 k ohm	±5%	¼W	CARBON FILM						
R117	2412110007	5.6 k ohm	±5%	¼W	CARBON FILM						
R118	2412110007	5.6 k ohm	±5%	¼W	CARBON FILM						
R119	2412088003	680 ohm	±5%	¼W	CARBON FILM						
R120	2412088003	680 ohm	±5%	¼W	CARBON FILM						

(Con.)

Ref. No.	Part No.	Part Name & Descriptions		Ref. No.	Part No.	Part Name & Descriptions	
A R179	2521034003	82pF	±5% 50V MICA FILM	C46	2521014007	15pF	±5% 50V MICA FILM
A R180	2521034003	82pF	±5% 50V MICA FILM	C47	2554161008	0.0047μF	±5% 50V PLASTIC FILM
A R185	2554149004	10μF	±5% 50V PLASTIC FILM	C48	2554161008	0.0047μF	±5% 50V PLASTIC FILM
A R186	2554149004	10μF	±5% 50V PLASTIC FILM	C49	2554121006	100pF	±5% 50V PLASTIC FILM
<b>CAPACITORS</b>				C50	2554121006	100pF	±5% 50V PLASTIC FILM
C01	2544015009	10μF	16V ELECTROLYTIC	C51	2554131009	270pF	±5% 50V PLASTIC FILM
C02	2544015009	10μF	16V ELECTROLYTIC	C52	2554131009	270pF	±5% 50V PLASTIC FILM
C03	2521034003	100pF	±5% 50V MICA FILM	C53	2544004007	220μF	6.3V ELECTROLYTIC
C04	2521034003	100pF	±5% 50V MICA FILM	C54	2544004007	220μF	6.3V ELECTROLYTIC
C05	2544044009	1μF	50V ELECTROLYTIC	C55	2544004007	220μF	6.3V ELECTROLYTIC
C06	2544044009	1μF	50V ELECTROLYTIC	C56	2544004007	220μF	6.3V ELECTROLYTIC
C07	2554149004	0.0015μF	±5% 50V PLASTIC FILM	C57	2544044009	1μF	50V ELECTROLYTIC
C08	2554149004	0.0015μF	±5% 50V PLASTIC FILM	C58	2544044009	1μF	50V ELECTROLYTIC
C09	2544015009	10μF	16V ELECTROLYTIC	C59	2544044009	1μF	50V ELECTROLYTIC
C10	2544015009	10μF	16V ELECTROLYTIC	C60	2544044009	1μF	50V ELECTROLYTIC
C11	2561026000	1μF	±10% 125V METALIZED FILM	C61	2554131009	270pF	±5% 50V PLASTIC FILM
C12	2561026000	1μF	±10% 125V METALIZED FILM	C62	2554131009	270pF	±5% 50V PLASTIC FILM
C13	2521008000	8pF	±0.5pF 50V MICA FILM	C63	2544060025	1μF	100V ELECTROLYTIC
C14	2521008000	8pF	±0.5pF 50V MICA FILM	C64	2544060025	1μF	100V ELECTROLYTIC
C15	2521016005	18pF	±5% 50V MICA FILM	C65	2544060025	1μF	100V ELECTROLYTIC
C16	2521016005	18pF	±5% 50V MICA FILM	C66	2544060025	1μF	100V ELECTROLYTIC
C17	2521026008	47pF	±5% 50V MICA FILM	C71	2521034003	100pF	±5% 50V MICA FILM
C18	2521026008	47pF	±5% 50V MICA FILM	C72	2521034003	100pF	±5% 50V MICA FILM
C19	2521081030	5pF	±0.5pF 500V MICA FILM	<b>OTHER PARTS</b>			
C20	2521081030	5pF	±0.5pF 500V MICA FILM	RL01 RL02	2220700007	P.W. BOARD	
C21	2554145008	0.001μF	±5% 50V PLASTIC FILM		2090047903	0.6 JUMPER WIRE SHORTLEAD USED 74	
C22	2554145008	0.001μF	±5% 50V PLASTIC FILM		EP-5667H1	TERMINAL FOR WRAPPING PIN USED 2	
C23	2554084017	0.01μF	±5% 100V PLASTIC FILM		EP-6071	BASE PIN USED 6	
C24	2554084017	0.01μF	±5% 100V PLASTIC FILM		2035622008	3P. CONNECTOR BASE USED 2	
C25	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2050122033	3P. CONNECTOR PIN ASS. USED 4	
C26	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2050075025	2P TERMINAL USED 2	
C27	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2140029004	REED RELAY	
C28	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2140029004	REED RELAY	
C29	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2030223017	1P. CONNECTOR CORD FOR L	
C30	2554161008	0.0047μF	±5% 50V PLASTIC FILM		2030223020	1P. CONNECTOR CORD FOR R	
C31	2554161008	0.0047μF	±5% 50V PLASTIC FILM		4450033005	WIRE CLAMP BAND USED 4	
C32	2554161008	0.0047μF	±5% 50V PLASTIC FILM		4170139001	POWER RADIATOR USED 2	
C33	2544059081	10μF	63V ELECTROLYTIC		4700012022	CROSS PAN SCREW WITH S. WASHER 3x12 USED 16	
C34	2544059081	10μF	63V ELECTROLYTIC		4120871005	RADIATOR BRACKET (A) USED 2	
C35	2544059081	10μF	63V ELECTROLYTIC		4120872004	RADIATOR BRACKET (B) USED 2	
C36	2544059081	10μF	63V ELECTROLYTIC		4120873003	BRACKET (A) USED 2	
C37	2544060025	1μF	100V ELECTROLYTIC		4120874002	BRACKET (B) USED 2	
C38	2544060025	1μF	100V ELECTROLYTIC		4730354035	TAPPING SCREW (2)3x8 USED 16	
C39	2544060025	1μF	100V ELECTROLYTIC				
C40	2544060025	1μF	100V ELECTROLYTIC				
C41	2561017019	0.01μF	±10% 630V METALIZED FILM				
C42	2561017019	0.01μF	±10% 630V METALIZED FILM				
C43	2521014007	15pF	±5% 50V MICA FILM				
C44	2521014007	15pF	±5% 50V MICA FILM				
C45	2521014007	15pF	±5% 50V MICA FILM				

## POWER SUPPLY &amp; PROTECTOR UNIT ETC-432



Ref. No.	Part No.	Part Name & Descriptions			
SEMICONDUCTORS					
IC03	2630155006	μPC78M15	INTEGRATED CIRCUIT		
IC04	2630102004	HA12002W	INTEGRATED CIRCUIT		
TR02	2710102005	2SA1015(Y)	TRANSISTOR		
TR03	2710105002	2SA966(Y)	TRANSISTOR		
TR04	2750018023	2SK30A(R)/(O)	FIELD EFFECT TRANSISTOR		
TR05	2730235004	2SC1841(F)	TRANSISTOR		
TR07	2730198031	2SC1815(BL)/(GR)	TRANSISTOR		
TR08	2730198031	2SC1815(BL)/(GR)	TRANSISTOR		
D01	2760237001	RV06	DIODE		
D02	2760244007	MZ303A	DIODE		
D03	2760237001	RV06	DIODE		
D04	2760239009	S1RBA20F	DIODE		
D05	2760244007	MZ303A	DIODE		
D06	2760049008	1S2076	DIODE		
D08	2760237001	RV06	DIODE		
D10	2760049011	1S2076A	DIODE		
D11	2760049011	1S2076A	DIODE		
RESISTORS					
R01	2410185005	1 k ohm ±5% 1/4W	CARBON FILM		
R02	2412152007	330 k ohm ±5% 1/4W	CARBON FILM		
R03	2412152007	330 k ohm ±5% 1/4W	CARBON FILM		
R04	2412126004	27 k ohm ±5% 1/4W	CARBON FILM		
R05	2412084007	470 ohm ±5% 1/4W	CARBON FILM		
R08	2410179008	560 ohm ±5% 1/4W	CARBON FILM		
R09	2412116001	10 k ohm ±5% 1/4W	CARBON FILM		
R10	2412116001	10 k ohm ±5% 1/4W	CARBON FILM		
R12	2412120000	15 k ohm ±5% 1/4W	CARBON FILM		
R13	2412120000	15 k ohm ±5% 1/4W	CARBON FILM		
R14	2410175002	390 ohm ±5% 1/4W	CARBON FILM		
R15	2412108006	4.7 k ohm ±5% 1/4W	CARBON FILM		
R16	2412163009	910 k ohm ±5% 1/4W	CARBON FILM		
R17	2412044005	10 ohm ±5% 1/4W	CARBON FILM		
R18	2412116001	10 k ohm ±5% 1/4W	CARBON FILM		
R19	2412129001	36 k ohm ±5% 1/4W	CARBON FILM		
R20	2412129001	36 k ohm ±5% 1/4W	CARBON FILM		
R21	2412108006	4.7 k ohm ±5% 1/4W	CARBON FILM		
Ref. No.	Part No.	Part Name & Descriptions			
R22	2440013024	4.7 ohm ±5% 1W	METAL OXIDE FILM		
R24	2412060005	47 ohm ±5% 1/4W	CARBON FILM		
R25	2412060005	47 ohm ±5% 1/4W	CARBON FILM		
R26	2440017020	10 ohm ±5% 1W	METAL OXIDE FILM		
R27	2440017020	10 ohm ±5% 1W	METAL OXIDE FILM		
CAPACITORS					
C01	2544024003	4.7μF	25V ELECTROLYTIC		
C02	2544024003	4.7μF	25V ELECTROLYTIC		
C03	2521018003	22pF ±5%	50V MICA FILM		
C04	2544079016	2200μF	25V ELECTROLYTIC		
C08	2544015009	10μF	16V ELECTROLYTIC		
C09	2544038002	100μF	35V ELECTROLYTIC		
C10	2544039001	220μF	35V ELECTROLYTIC		
C11	2544044009	1μF	50V ELECTROLYTIC		
C12	2544066003	2.2μF	50V ELECTROLYTIC		
C13	2544005006	330μF	6.3V ELECTROLYTIC		
C14	2544003008	100μF	6.3V ELECTROLYTIC		
C15	2549015004	2.2μF ±10%	10V ELECTROLYTIC		
C16	2561017035	0.022μF ±10%	630V METALIZED		
C17	2561017035	0.022μF ±10%	630V METALIZED		
C18	2544009002	47μF	10V ELECTROLYTIC		
C25	2561016007	0.068μF ±10%	400V METALIZED		
C26	2561016007	0.068μF ±10%	400V METALIZED		
C27	2561016007	0.068μF ±10%	400V METALIZED		
C28	2561016007	0.068μF ±10%	400V METALIZED		
OTHER PARTS					
	2220703004	P.W. BOARD			
	2090008120	JUMPER SHORTLEAD P=10mm USED 4			
	EP-6071	BASE PIN USED 2			
	2050087039	3P. TERMINAL USED 2			
	2050087055	5P. TERMINAL USED 1			
	2035622008	3P. CONNECTOR CORD (FOR +B, -B, E)			
	2036082003	4P. CONNECTOR CORD (FOR MUT, LED)			
	2320017001	INDUCTOR			
L01	2320017001	INDUCTOR			
L02	2140041008	RELAY			
RL01	4170043100	RADIATOR			
	4730354019	TAPPING SCREW (2)3x8			



# DENON

NIPPON COLUMBIA CO., LTD.  
No. 14-14, 4-CHOME AKASAKA,  
MINATO-KU, TOKYO 107, JAPAN  
TEL: 03-584-8111  
TLX: JAPANOLA J22591  
CABLE: NIPPONCOLUMBIA TOKYO

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